Tropisetron reduces vomiting after tonsillectomy in children

C. ANG, W. HABRE, C. SIMS

Summary

Nausea and vomiting are common after adenotonsillectomy. Tropisetron is a new, long-acting serotonin antagonist that is an effective antiemetic in adults. Its effect on postoperative nausea and vomiting in children is unknown. We carried out a randomized, double-blind study of the effects of a single i.v. dose of tropisetron on vomiting after tonsillectomy with or without adenoidectomy in children. Forty-eight children undergoing tonsillectomy or adenotonsillectomy received at induction of anaesthesia either tropisetron 0.1 mg kg⁻¹ or placebo. The incidence of vomiting was recorded for the first 24 h after surgery by nursing staff and then by parents after discharge from hospital. Children received metoclopramide 0.15 mg kg⁻¹ as a rescue antiemetic. We found that tropisetron reduced the overall incidence of emetic episodes after surgery (29% compared with 65% in control group; \( P = 0.019 \)) and the incidence of severe vomiting (0% compared with 52% in control group; \( P < 0.001 \)). We conclude that tropisetron is an effective antiemetic for children undergoing tonsillectomy. (Br. J. Anaesth. 1998; 80: 761–763)

Keywords: children; surgery tonsillectomy; vomiting, antiemetics tropisetron

Patients and methods

After obtaining approval from the hospital ethics committee and written informed parental consent, we studied 48 children (aged 2–12 yr, ASA I or II) scheduled to undergo elective tonsillectomy or adenotonsillectomy. Children who had cardiac, renal or liver disease were excluded.

Children were premedicated with oral paracetamol 15 mg kg⁻¹ and EMLA cream applied to both hands 1 h before surgery. Anaesthesia was induced with thiopentone 4–5 mg kg⁻¹ or halothane, followed by atracurium 0.5 mg kg⁻¹. Immediately after tracheal intubation, children received i.v. tropisetron 0.1 mg kg⁻¹ or normal saline. We used a random number table with blocked randomization to allocate children to treatment groups. The volume of study drug was standardized to 0.1 ml and was drawn up by a staff member who took no further part in the study.

Anaesthesia was maintained using positive pressure ventilation, nitrous oxide and oxygen mixture and isoflurane or halothane, with i.v. pethidine 1 mg kg⁻¹ for analgesia. At the end of the surgical procedure, residual neuromuscular block was antagonized with atropine 0.02 mg kg⁻¹ and neostigmine 0.05 mg kg⁻¹. During recovery, i.v. pethidine 0.25 mg kg⁻¹ at 3-min intervals was given as required to control pain. On the ward, analgesia was provided by i.m. pethidine 1–1.5 mg kg⁻¹ every 4 h, or oral paracetamol with or without codeine.

Observations were made by nursing staff who were blinded to the antiemetic used. Retching and vomiting were grouped under the common term “emetic episode”. Vomiting was defined as the forceful expulsion of a measurable amount of gastric contents. When no stomach contents were expelled, the expulsion was classified as retching. The incidence of emesis was evaluated at five intervals over the first 24 h following operation: 0–2 h, 2–6 h, 6–12 h, 12–18 h, and 18–24 h.

Any child who had three or more emetic episodes received metoclopramide 0.15 mg kg⁻¹ as rescue medication. Children were offered oral fluids when they were alert enough to tolerate them. In children discharged from hospital before 24 h, the incidence of emetic episodes was ascertained by telephone follow-up.
Sample size was calculated on the basis of desire to detect a reduction in the incidence of vomiting from 75% in the placebo group to 30% in the tropisetron group, with a type I error rate of 0.05 and a power of 0.8. Parametric data were compared using Student's t test. The incidence of vomiting during each interval and use of rescue antiemetic were compared using the Fisher exact test. P < 0.05 was taken as significant.

Results
We studied 48 children but data for one child in the control group were excluded because of protocol violation (metoclopramide was given during operation). The two groups were comparable for age, sex, weight and duration and type of surgical procedure (table 1). Anaesthesia was induced intravenously in most children; gas was used in only four children in the control group and two in the tropisetron group. The total dose of pethidine ranged from 0.8 mg kg\(^{-1}\) to 2 mg kg\(^{-1}\), the range of doses being similar in both groups. In the control group, only one child had 2 mg kg\(^{-1}\) of pethidine and vomiting was observed. Four children in the tropisetron group received 2 mg kg\(^{-1}\) and of these, two vomited while two did not. Ten children in each group were given i.m. pethidine after surgery.

We found that tropisetron reduced the incidence of vomiting. Fifteen children in the control group (65%) had one or more emetic episode compared with seven (29%) in the tropisetron group (P = 0.019) (fig. 1). We also found that vomiting was more severe in the control group. Of the children who vomited, 12 (52%) in the control group had three or more emetic episodes compared with none in the tropisetron group (P < 0.001). Only five of the children in the control group who had three or more emetic episodes received metoclopramide as rescue medication. In the control group, most children had emetic episodes in the first 12 h after operation. In the tropisetron group, the incidence of vomiting followed no discernible time pattern (fig. 1). The average length of stay in hospital was 20.5 h in both groups. Nineteen children in the tropisetron group and 20 children in the control group were discharged home less than 24 h after surgery, and were followed up by telephone. Three children could not be contacted by telephone after discharge. The rest of the children in both groups had no vomiting after discharge.

Discussion
We found that tropisetron was an effective antiemetic for children undergoing tonsillectomy. The incidence of vomiting was 65% in the control group but only 29% in children who had received tropisetron. Tropisetron also reduced the severity of vomiting, with 12 (52%) in the control group vomiting more than three times compared with none in the tropisetron group.

Tropisetron is a highly selective, competitive antagonist of the 5HT\(_3\) receptor. 5HT\(_3\) receptor antagonists lack the dysphoric and extrapyramidal effects of metoclopramide and droperidol.10,11

The antiemetic effects of tropisetron have been studied in children receiving chemotherapy; in this group, tropisetron has a plasma terminal half-life of 5.3–6.6 h.4 Ondansetron was found to have a plasma terminal half-life of 2.6–3.1 h in children undergoing surgery.12 Ondansetron was effective in preventing vomiting for only the first 4 h after surgery in one study,4 and in another, two doses of ondansetron were more effective than one dose in children undergoing tonsillectomy.13 The longer plasma elimination half-life of tropisetron may be advantageous in children at risk of postoperative nausea and vomiting. We saw no increase in the incidence of vomiting in our children during the 24 h after surgery. Furthermore, no child in the tropisetron group received rescue therapy, which might otherwise have masked a rise in the incidence of postoperative vomiting.

The dose of tropisetron used in our study was 0.1 mg kg\(^{-1}\), which is similar to the dose used in adult studies of postoperative nausea and vomiting, but smaller than that used in paediatric chemotherapy studies.

Swallowed blood contributes to the high incidence of vomiting after tonsillectomy. There has been concern that use of an antiemetic after tonsillectomy might allow swallowed blood to accumulate in the stomach and conceal postoperative haemorrhage. Although there have been anecdotal reports of this occurring, just how effective antiemetics are at preventing vomiting when there is a large amount of blood in the stomach is unknown. Postoperative haemorrhage occurs in less than 1% of cases and retching and vomiting may even contribute by causing venous engorgement. The key to picking up early signs of haemorrhage is conscientious postoperative observation of vital signs and not only the

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Table 1 Patient characteristics (mean (SD)) or number

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Tropisetron</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>6.3 (2.6)</td>
<td>5.7 (2.5)</td>
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<tr>
<td>Sex (M/F)</td>
<td>12/11</td>
<td>14/10</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>26.0 (12.4)</td>
<td>23.2 (10.1)</td>
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<tr>
<td>Adenotonsillectomy</td>
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<td>4</td>
</tr>
<tr>
<td>Tonsillectomy</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>Duration of surgery (min)</td>
<td>25 (10)</td>
<td>25 (12)</td>
</tr>
<tr>
<td>Average hospital stay (h)</td>
<td>20.5 (2.9)</td>
<td>20.5 (3.1)</td>
</tr>
<tr>
<td>Average dose of pethidine (mg kg(^{-1}))</td>
<td>1.2 (0.3)</td>
<td>1.2 (0.5)</td>
</tr>
</tbody>
</table>

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Figure 1 Incidence of vomiting after tonsillectomy or adenotonsillectomy in children who received either i.v. tropisetron 0.1 mg kg\(^{-1}\) (n = 24) or placebo (n = 23). *P < 0.05.
observation of actual blood loss. If antiemetics are deliberately withheld to avoid concealing postoperative haemorrhage, many children will be left to vomit and suffer after tonsillectomy.

In addition to swallowed blood, opioid drugs given for postoperative analgesia may induce vomiting. All children received pethidine during surgery, and all but one child received a dose of 1 mg kg\(^{-1}\). However, the amount of pethidine given postoperatively could not be standardized as this was determined by the analgesic requirements of the child. Nevertheless, both groups received a similar total dose of pethidine.

We had hoped that the administration of metoclopramide would be a reflection of the severity of vomiting, as the study protocol called for its administration in children who had vomited three or more times. However, we found that of the 12 children who had vomited three or more times, only five received metoclopramide. We believe that nursing staff were reluctant to use metoclopramide because of fear of possible side effects.

Vomiting is a distressing yet common postoperative complication. In children undergoing tonsillectomy, vomiting as well as postoperative pain can be particularly stressful for both child and parent. Tropisetron, by decreasing the incidence and severity of vomiting, contributes to a less stormy postoperative course.

**Acknowledgement**

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**References**


